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BIRDS COLLECTED DURING THE WHITNEY SOUTH SEA EXPEDITION. XXXIII¹

NOTES ON NEW GUINEA BIRDS. I

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I have been working on a list of New Guinea birds for a period of more than seven years. In order to present more than a compilation it was found necessary to revise critically every genus occurring in that region. The results of these revisions have been published in previous papers as far as passerine birds are concerned. Most of the non-passerine species, however, extend their range considerably beyond New Guinea, and revisions of these species could not have been undertaken without consulting the rich material of the Rothschild Collection and the extensive collections of the Whitney South Sea Expedition made in the Bismarck Archipelago, the Louisiade and d'Entrecasteaux Archipelagoes, the Solomon Islands, and Polynesia. It was thought best to include these revisions in the present series, since a considerable portion of the examined material was collected by the Whitney Expedition.

The present paper contains a study of the genus *Collocalia*. No list of the New Guinea birds could be prepared without a critical revision of the vast amount of new material of this genus accessioned by the American Museum during recent years. The variation and the relationship of the New Guinea species cannot be understood without reference to the extralimital species. Still, the emphasis of the following revision is on the New Guinea forms, and all the others are treated only incidentally. I am deeply obliged to Dr. E. Stresemann for much advice and for the loan of valuable material, including the type of *pseudovestita*.

NOTES ON THE GENUS *COLLOCALIA*

Every author who has ever worked with these small swiftlets of the Indo-Australian region will contend that their classification presents the most difficult problem in the taxonomy of birds. The members of this genus live in large or small colonies, frequently in inaccessible caves, and

¹ Previous papers in this series comprise American Museum Novitates, Nos. 115, 124, 149, 322, 337, 350, 356, 364, 365, 370, 419, 469, 486, 488, 489, 502, 504, 516, 520, 522, 531, 590, 609, 628, 651, 665, 666, 709, 714, 820, 828, and 912.

every population is slightly different from the next one. They are difficult to collect and not one of the museums of the world has adequate material. To make matters worse, most of the species are of practically the same dull sooty gray coloration with almost the same development of the structural characters (such as bill, feet, wing-formula, etc.). (See Stresemann, 1932, Bull. Raffl. Mus., No. 6, pp. 83-84.)

The time has not yet come to undertake a final satisfactory classification of the genus, because the material at hand is still insufficient for the correct description of the more difficult forms and for the understanding of the natural relationships. On the other hand, the American Museum has recently received so much new material, that it has seemed advisable to examine it in the light of the recent revisions. These studies have been carried on by me for more than three years and no final conclusions have yet been reached. It has, however, been possible, to clear up some doubtful points and to make certain observations which will help future workers. This has encouraged me to publish the results of my studies although they are admittedly of a preliminary and incomplete nature.

The literature on this genus illustrates exceedingly well the trends of ornithological classification. We see in the earlier part of this century conscientious efforts to analyze the characters of the various geographical races without much of an effort to combine the many disconnected units into natural groups of related forms. Oberholser's papers were written in this analytical stage. In opposition to this trend the Formenkreislehre gained increasing influence during the twenty's, emphasizing the principle of geographical representation frequently with disregard of a thorough morphological examination of the treated forms. During this period (1925-1926) Stresemann proposed a classification of this genus, which grouped all the then known forms in six species: *francica*, *fuciphaga*, *gigas*, *troglodytes*, *esculenta*, and *brevirostris*. A reaction to this ultra-synthetic trend was inevitable, and Stresemann himself was the first to suggest the breaking up of these large Formenkreise into smaller, but more natural species. His recent papers (1932, Bull. Raffl. Mus., Singapore, No. 6, pp. 83-101, and 1932, Novit. Zool., XXXVIII, pp. 164-170) are the starting points of my work, which fully confirms his conclusion that the white-rumped forms of the Australian region should be separated specifically from *francica* as *spodiopygia*, and that the dark-rumped forms should be separated from *fuciphaga* as *vanikorensis*. I disagree with Stresemann in regard to the arrangement of the following forms: *baru*, *hirundinacea*, *excelsa*, *infuscata*, *ceramensis*, *sororum*, and *terraereginae*, all of which I remove from *vanikorensis*.

I fully agree with Stresemann's recent conclusion (1932, Bull. Raffl. Mus., No. 6, p. 93) that the natural consequence of the recent studies of this genus is, to break it up into a greater number of species. Reviewers of this genus have too frequently forgotten the principle that whenever closely related species break up into numerous subspecies (as *Collocalia!*), the genus to which they belong almost always also breaks into numerous species. The widely distributed genus *Collocalia*, which ranges from the Madagascar region to the Marquesas Islands (practically halfway around the world) is no exception to this rule. Instead of six species, as Stresemann thought in 1925, it probably contains more than fifteen. The mere fact that such exceedingly similar forms occur together at the same localities as *hirundinacea* and *vanikorensis* in New Guinea, as *natunae*, *germani*, and *mearnsi* in the Borneo region, as *javensis* and *fuciphaga* in Java, and as *amelis* and *mearnsi* in the Philippines, should be a sufficient warning against grouping in one species anything but very similar forms.

I have seen but very little material of the forms occurring on the islands of the Indian Ocean, as well as of those occurring on the Asiatic continent and the Greater Sunda Islands. I shall therefore leave most of them out of the discussion at the present time. They will be reviewed in greater detail at a later occasion. I shall also omit any reference to such well-defined species as *esculenta*, *trogodytes*, *gigas*, *whiteheadi*, and *lowi*. They are so different that they are not likely to be confused with those forms that are usually listed as subspecies of *fuciphaga*, *francia*, and *vestita*.

Like Stresemann (*loc. cit.*, p. 85) I am using in addition to the length of wing and tail, also the "tail-furcation" (difference of length between the shortest and the longest tail-feather) and the "tail-index" which is the length of the longest tail-feather multiplied by 100 and divided by the length of the wing. I have also attempted to introduce several new morphological characters into the discussion of the various subspecies, such as size and shape of the bill, structure of the feathers of crown and throat, and the presence or absence of white downy tips to the bases of the feathers of the back. Additional features could probably be found at a still closer and more patient examination of these birds.

***Collocalia leucophaea* (Peale)**

This large dull colored species stands quite by itself. It is characterized by its soft fur-like plumage, by its long tail (index up to 50), by the reduction of the supraloral spots, by its black under tail-coverts,

and many other features. *C. l. ocista* Oberholser is very similar to the typical form in general coloration, but differs in many other respects. A detailed revision of this species is in preparation.

RANGE.—Society and Marquesas Islands.

***Collocalia vanikorensis* (Quoy and Gaimard)**

I had measured up most of our material of this species already several years ago and had made detailed notes on the populations of the different islands. A more intensive study of the genus *Collocalia* has finally convinced me, that there is no better way to come to definite conclusions concerning the taxonomy of this difficult genus than by the careful analysis and description of the known populations. There are only two alternatives in treating this species: either we recognize no races at all and sink *moluccarum*, *yorki*, *steini*, and *waigeuensis* in the synonymy of *vanikorensis* or else we give each circumscribed population a subspecific name. Following the precedent set by Stresemann, I follow the latter course.

During the preparation of this review I have examined 213 specimens of the subsequently discussed forms, including all the types, with the exception of that of *vanikorensis* Quoy and Gaimard which is in the Paris Museum. The amount of collecting done in recent years is best illustrated by the fact that I had before me 213 specimens of the one species *vanikorensis*, while Oberholser had at his disposition only 159 specimens of all the species of *Collocalia* when he wrote his first monograph of the genus in 1906.

***Collocalia vanikorensis vanikorensis* (Quoy and Gaimard)**

Hirundo vanikorensis QUOY AND GAIMARD, 1830, 'Voy. "Astrolabe,"' Zool., p. 206, Pl. XII, fig. 3.—Vanikoro Island, Santa Cruz Archipelago.

A large dark form; back almost as dark as crown and with a greenish (or purplish in worn plumage) gloss; rump not appreciably lighter than back; upper throat very light and strongly contrasting with dark abdomen; shaft-streaks on abdomen more or less pronounced; ear-coverts dark, contrasting with the light throat; loreal spots medium sized and not conspicuous; under wing-coverts pure black or with inconspicuous pale edges; tarsus reddish brown and always bare; white¹ on back much reduced; bill large and not strongly curved; tail long (index usually above 46); strongly furcated.

RANGE. New Caledonia, New Hebrides, Santa Cruz Islands, Reef and Duff groups, and Solomon Islands.

¹ "White on back" means the presence of white downy tips to the rami of the basal part of the feathers of the back and to the after shafts of these feathers.

There is little doubt that I have united under this name a somewhat heterogenous assemblage of populations, but the material at hand is not in a sufficiently good condition to permit any further subdivision at the present time. Old skins, that is skins which are in collections for more than 8 or 10 years show already definite signs of "foxing." The upper parts turn lighter and more brownish and the under parts also more brownish and dirtier. Still more important are differences between freshly molted and very worn specimens. Fresh birds are darker and more greenish above and on the wings, worn birds more bluish or purplish, the feathers above the eye and the under wing-coverts sometimes acquire pale edges through wear, and the under parts may become very brownish and soiled during the breeding season. Immature birds are also different from adults. Although it is impossible always to tell them apart, young birds seem to differ by smaller size, less furcation of the tail, broader primaries, less glossy plumage, pale edges to the secondaries (in fresh plumage), broad soft edges to the feathers of the rump, more pronounced pale margins to the feathers above the eye and at the wing-bend, and by the generally smaller size. To give a correct description of each subspecies one must keep all these variations in mind.

I shall now give a more detailed discussion of the various populations combined under the name *vanikorensis*, to indicate where future division will have to be made, after more material has become available.

NEW CALEDONIA.—No material available. Our knowledge of the occurrence of the species is based on sight records (Layard, Ibis, 1878, p. 253, and id., Ibis, 1882, p. 503).

ERROMANGO, NEW HEBRIDES.—Two immatures examined (L. Macmillan). Both rather pale underneath, one with a few white (albinistic) feathers on the abdomen.—Wing 121, 126; furcation 7, 7; index 44.7.

EFATE.—3 specimens. Wing 119–125; furcation 7–10; index 45.2.

EPI.—5 specimens. Wing 119–125; furcation 8–11 (9.0); index 46.4.

SANTO.—12 specimens. Wing 116–124 (119.7); furcation 7–11 (8.4); index 46.1.

VANUA LAVA.—2 specimens. Wing 120, 122; furcation 8.5, 9; index 45.9.

REEF-DUFF IS.—4 specimens. Wing 115–118 (116.8); furcation 7–8 (7.5); index 46.4.

Additional specimens were obtained at Tongoa, Aoba, Pentecost, Malekula, and Dolphin Island.

It is evident from these measurements that in southern Melanesia there is a gradual decline in size as we go north toward the equator. There are unfortunately no specimens available from Vanikoro, Santa Cruz Islands, the type-locality of this subspecies.

SOLOMON ISLANDS.—There are several populations recognizable, some dark (Vella Lavella, Choiseul), some light (Santa Anna), some variable or intermediate (Guadalcanar, Bougainville, Ugi). All these birds have, however, similar proportions. The wing never goes above 117.5 (average 114.4), the tail is medium (index 44.1), and the furcation is slight (5–8, av. 6.1).

These measurements and proportions are quite different from those of the New Hebrides birds. More material from the Santa Cruz Islands is needed to decide whether or not it is worthwhile to describe a new race.

***Collocalia vanikorensis* subspecies**

RANGE.—Bismarck Archipelago.

A large series collected at Wide Bay was unfortunately collected within one week and practically all specimens are molting or immature. The wing seems to vary between 117 and 126, with an average of about 120, which agrees well with some measurements recorded by Stresemann (1923, Arch. Naturgesch., LXXXIX, A, fasc. 8, p. 28), the tail furcation is about 7–9 (7.9), and the tail-index 42–44. In coloration it is similar to *vanikorensis*, but slightly lighter above and below, particularly on upper throat and ear-coverts, the white supraloral spot seems to be larger and the pale edges on the under wing-coverts more pronounced.

Quite similar in coloration and proportion is a series of 8 birds collected by Eichhorn on New Hanover, in March, 1923. Wing 118–123 (120.0), furcation 7–9 (7.8), tail-index 43.0.

***Collocalia vanikorensis lihirensis*, new subspecies**

TYPE.—No. 335906, Amer. Mus. Nat. Hist.; ♀ ad.; Lihir Island, Lihir group near New Ireland; September 15, 1934; William F. Coultas.

A large dark form. Similar to *vanikorensis*, but larger and with a bigger bill; upper parts darker and more greenish; supraloral spot larger; shaft-streaks on under parts more pronounced; more white on back (see footnote, p. 4).

Ten males, wing, 119–127 (123.9), furcation 7–10 (8.5), tail-index 45.6; twelve females, wing, 121–129 (124.0), furcation 6–9 (8.0), tail-index 45.1.

RANGE.—Islands northwest of New Ireland (Lihir, Tabar, and St. Matthias).

A single male from St. Matthias (120, 9, 45.5)¹ and two males from Tabar Island (123.5, 9.5, 45.3) are still darker, particularly on the belly, but agree in their proportions quite well with *lihirensis*.

***Collocalia vanikorensis coultasi*, new subspecies**

TYPE.—No. 334780, Amer. Mus. Nat. Hist.; ♀ ad.; Malai Bay, Manus, Admiralty Islands; January 3, 1934; William F. Coultas.

A large, light form. Under parts with a somewhat silvery appearance, abdomen only slightly darker than throat; back paler than crown; rump much paler than back; in worn specimens almost whitish; ear-coverts rather light; a great deal of white on the back (see footnote p. 4); shaft-streaks on abdomen variable; supraloral spots medium; crown and wings rather bluish; tail not long, but well furcated.

Wing (7 specimens), 121–130 (124.7), furcation 6–11 (8.0), tail-index 43.3–44.6.

RANGE.—Only known from the type-locality.

A series from Rambutyo Island (March, April, 1934, Coultas coll.) is similar to *coultasi* but not quite as light and with the rump only slightly lighter than the back. Most specimens are, unfortunately, immature and the measurements therefore inconclusive (121.0, 8.2, 45.5).

***Collocalia vanikorensis tagulae*, new subspecies**

TYPE.—No. 450941, Amer. Mus. Nat. Hist. (Rothschild Collection); ♀ ad.; Sudest (= Tagula) Island, Louisiade Archipelago; May 3, 1916; A. S. Meek.

A large, light form. Abdomen only slightly darker than throat, shaft-streaks variable, upper parts more greenish than in *vanikorensis*, back paler than crown; rump as dark as back; ear-coverts not very dark; pale edges of under wing-coverts pronounced; not much white on back; supraloral spot small; size large, tail long and deeply furcated.

Wing 124–129 (126.2), furcation 9–12 (10.1), index 45.5.

RANGE.—Sudest (= Tagula) Island, Louisiades.

A series of six birds from Misima (= St. Aignan) is quite similar in coloration, but size and proportions are different.

Wing, 122–124 (123.2), furcation 7–10 (8.3), index 43.8.

It seems best to include these birds with *tagulae*. Two males from the Trobriand Islands (117.5, 10.0, 47.0) and two females from Woodlark Island (117.0, 10.0, 46.2) are similar to *tagulae*, but slightly darker, particularly on the abdomen. Their extraordinary proportions (short wing, but long and deeply furcated tail) seem to indicate that they belong to an undescribed race. The meagerness of the material, particularly the fact that one of the specimens is molting and two of them are apparently in immature plumage makes it undesirable to name this form.

¹ The three figures in the parenthesis in this and other instances indicate the average of wing-length, of tail-furcation, and of the tail-index.

***Collocalia vanikorensis granti*, new subspecies**

TYPE.—No. 450940, Amer. Mus. Nat. Hist. (Rothschild Collection); ♂ ad.; Setekwa River, Dutch New Guinea, August 4, 1910; A. S. Meek.

A small, light form. Rather similar to *tagulae*, but a little darker, both above and on the abdomen; much lighter than *steini* or *waigeuensis*; tarsus usually bare, sometimes a few scattered feathers on the upper end of the tarsus; very little white on back (see footnote p. 4); pale edges on under wing-coverts usually present; supra-loral spot medium; ear-coverts rather dark; bill large; upper parts distinctly greenish, back hardly paler than crown, rump as dark as back.

Wing, 115, 115.5, 116.5; outermost tail-feather 48.5, 49, 49; furcation 6.5, 6.5, 7; tail-index 42.2.

RANGE.—Lowlands of southern and eastern New Guinea; Ferguson Is.

I name this race in honor of the late Ogilvie-Grant, who was the first ornithologist to recognize the specific distinctness of *Collocalia vanikorensis* and *hirundinacea*.

I have chosen the Setekwa River as type-locality for this subspecies because there is material from that district in several European museums.

Other New Guinea populations of this species do not completely agree with the type series, but they all agree in a fairly or very light coloration of the under parts, small size, shortness and slight furcation of tail.

A series of six birds from Bioto, Baroka Creek (near Hall Sound, southeast New Guinea) is quite similar to *granti*, but slightly darker above and below; size larger, wing 117–120 (118.2), furcation 6–10 (av.?), tail-index 42.5. Several specimens are molting or immature and the proportions are not quite certain.

A series of five birds from the neighboring mountains (Mafulu, Central Division) is larger, darker and in many ways more similar to typical *vanikorensis* than to *granti*; the under parts average, however, definitely paler and the upper parts more greenish; tail-furcation and tail-index are those of *granti*.—Wing, 118–123 (120.2), furcation 6–9 (7.6), tail-index 42.8.—This difference between a lowland and a highland population is another case of altitudinal variation (see Rand, 1936, Amer. Mus. Novit., No. 890).

A single ♀ from Keku, near Astrolabe Bay, is a little darker on crown and wings but otherwise like *granti*.—Wing, 120.5, furcation 7.5, index 41.5.

Four specimens from Japen (Serui 3, valley beyond Serui 1) are completing their molt and only one can be measured (118, 8.5, 42.4). They

agree with *granti* in the coloration of the under parts, but are darker above which may partly be due to the freshness of the plumage.

A single freshly molted male from the lower Menoo River (Weyland Mts.) is very dark both above and below.

A single female from Manokwari (in molt) agrees fairly well with *granti*. Further observations on some of these specimens can be found in Novit. Zool., XXXVIII, (1932), pp. 164-169, although Stresemann does not separate *vanikorensis* and *hirundinacea* in two species.

A single male from Fergusson Is. (A. S. Meek Coll.) agrees very well with the typical series of *granti*. It is still lighter underneath, the pale edges of the under wing-coverts are very pronounced and the supraloral spot is large (117, 7.5, 43.6).

***Collocalia vanikorensis steini* Stresemann and Paludan**

C. vanikorensis steini STRESEMANN AND PALUDAN, 1932, Novit. Zool., XXXVIII, p. 167.—Numfor Is., Geelvink Bay.

A medium-sized dark race. In coloration very much like *vanikorensis*, but tail apparently slightly shorter; wing (of not molting specimens) 115-123 (118.2), furcation 5-12 (9.0), tail-index 44.5.

RANGE.—Numfor Island.

***Collocalia vanikorensis waigeuensis* Stresemann and Paludan**

C. vanikorensis waigeuensis STRESEMANN AND PALUDAN, 1932, Novit. Zool., XXXVIII, p. 168.—Waigeu Island.

A small dark race, in coloration like *moluccarum*, *steini* and *vanikorensis*, but smaller and with a very short tail.

Wing 109-112 (110.3), furcation 5-8 (6.8), tail-index 41.3.

RANGE.—Waigeu Island.

***Collocalia vanikorensis yorki* Mathews**

Collocalia francica yorki MATHEWS, 1916, Bull. Brit. Orn. Club, XXXVI, p. 77.—Cape York.

A medium-sized, rather dark form. The unique type is about intermediate in coloration between *vanikorensis* and *granti*. Wing 120, tail 45/55, furcation 10, tail-index 45.8. More material is needed to characterize *yorki* more completely, particularly in comparison with *moluccarum*, *steini*, and *vanikorensis*:

RANGE.—Cape York Peninsula, Queensland.

***Collocalia vanikorensis moluccarum* Stresemann**

Collocalia fuciphaga moluccarum STRESEMANN, 1914, Verh. Orn. Ges. Bayern, XII, p. 7.—Banda Is., Moluccas.

A small dark form; back almost as dark as crown, and with a bluish-green gloss; rump not lighter than back; tarsus bare; abdomen distinctly darker than throat,

shaft-streaks not very pronounced; ear-coverts dark; supraloral spots large; under wing-coverts usually with conspicuous pale edges; little white on back (see footnote p. 4); bill large and fairly curved.

Wing 111.5, tail 42/51, furcations 9, tail-index 45.7.

RANGE.—Banda Is., Moluccas.

Populations, identified as *moluccarum*, have been recorded from a great many islands of the Moluccas and neighboring groups: Kei Islands, Kor, Goram, Ambon, and Morotai. I have seen only a few specimens from this large area, and I do not know whether or not all these birds really belong to *moluccarum*.

A series of six specimens from Koer Island is larger than the Banda bird (wing 116-120 (117.1), furcation 7-9 (8.0), tail-index 45.6). Six specimens from the Little Key Islands agree in coloration with *moluccarum*, but are worn and molting and cannot be measured.

In the Lesser Sunda Islands, not far from the Moluccas begins the range of a different, but similar species, that of *Collocalia* "*germani*," in the form *micans* Stresemann. It differs from *C. vanikorensis moluccarum* by having the tarsus frequently feathered, by having a smaller bill, by having much white on the back, by having the belly pale and not distinctly darker than the throat, and by having the crown much darker than the back, and consisting of smaller feathers.

Collocalia vanikorensis aenigma Riley

Collocalia vestita aenigma RILEY, 1918, Proc. Biol. Soc. Washington, XXXI, p. 156.—Parigi, north central Celebes.

A fairly large, not very dark race. Quite similar to *moluccarum*, but contrast between throat and abdomen more pronounced; shaft-streaks on abdomen conspicuous; coloration of upper parts darker and even in fresh specimens slightly more bluish, less greenish, in worn specimen very bluish; rump not, or only slightly paler than back; ear-coverts dark; loreal spots small and not conspicuous; under wing-coverts and often also the superciliary feathers with broad pale edges; tarsus bare or with a few scattered feathers near the upper end; very little white on back; tail short and not much furcated.—Wing, (14 specimens) 114-123 (119.0), outer tail-feather 47-52 (49.4), furcation 5-9 (6.4), tail-index 41.5. (The specimens recorded by Stresemann, 1932, Bull. Raffl. Museum, No. 6, p. 92 have the following tail-indices: 39.2, 41.8, 42.1, 42.4, and 43.9.)

RANGE.—Central Celebes and southeastern Celebes.

This is the fourth species with which this unfortunate form is being classified, after having been listed by Riley and Stresemann as subspecies of *vestita*, *fuciphaga*, and *francica*.

The relationship with *vanikorensis* is, however, quite obvious. It agrees with it in all the important specific characters: tarsus bare, feathers of crown large and not much darker than back, bill large and

not strongly curved, very little white on back (see footnote p. 4), feathers of abdomen differing from those of throat very markedly in structure and color. It differs from most forms of *vanikorensis* by its relatively short tail with only a slight furcation. It agrees in this respect with *C. v. granti* and *waigeuensis*.

***Collocalia vanikorensis heinrichi* Stresemann**

Collocalia francica heinrichi STRESEMANN, 1932, Ornith. Monatsber., XL, p. 110.—Talassa (Maros), south Celebes.

Very similar to *aenigma*, but abdomen lighter and grayer, upper parts more greenish; size smaller.

Wing 113, tail 42/47.5, furcation 5.5, tail-index 42.0.

RANGE.—South Celebes.

The greenish coloration of this specimen is partly due to the fact that it is quite fresh, while the series of *aenigma* examined by Stresemann is worn and molting. But even the fresh feathers of *aenigma* are more bluish than those of *heinrichi*.

Collocalia inquieta

Three similar forms of *Collocalia* are known from the Caroline Islands, *inquieta* Kittlitz from Kusaie, *rukensis* Kuroda from Ruk, and *ponapensis* Mayr from Ponape. The principal difference between the three forms is size. All three are similar to the species of *vanikorensis* group and a more detailed examination will probably prove that they belong to that species. At the time being, it seems advisable to treat it as a separate species, particularly in view of the fact that most other widespread genera (*Ducula*, *Gallicolumba*, *Ptilinopus*, *Halcyon*, *Aplonis*, *Myzomela*, and *Zosterops*) are represented in the Caroline Islands by endemic species.

Collocalia hirundinacea

All gray swiftlets of the genus *Collocalia* with a dark rump were until very recently considered subspecies of the Javanese *fuciphaga*. When Stresemann described, in 1914 from southwest New Guinea, a small population with silvery gray under parts and more or less feathered tarsus as *hirundinacea*, it was only natural that he regarded it also a subspecies of *fuciphaga*. Already in the following year (1915), however, Ogilvie-Grant pointed out that there were really two similar species living side by side, one which he called *C. fuciphaga vanikorensis* (= *C. vanikorensis granti* Mayr) and one which he admitted as good species: *C. hirundinacea* Stresemann. Although this was perfectly correct, it was ignored by subsequent workers on Papuan birds (Hartert, Strese-

mann, and others) with the result that all sorts of confusions occurred. As a matter of fact, even the typical series of *hirundinacea* from the Setekwa River contains both species, but the actual type specimen belongs to the species with feathered tarsus, so there can be no doubt about the name *hirundinacea*. In 1923 Stresemann named *pseudovestita* which according to the original description combines the coloration of *vanikorensis* with the feathered tarsus of *hirundinacea*. Again it was a mixed population, the type belonging to the feathered species *hirundinacea* and the paratype collected on the same day and locality (Jan. 11, 1901, Madang, Astrolabe Bay, O. Heinroth) belonging to *vanikorensis*. In 1932 Stresemann and Paludan were puzzled by the fact that Stein collected two very different populations on Japen Island. Again they belonged to the two species. The specimens collected at Kampong Baru and described as *C. vanikorensis baru* belonged to *C. hirundinacea*, and the specimens collected at Serui and recorded as *C. vanikorensis hirundinacea* belonged to *C. vanikorensis*. In 1933 when I was identifying the collections made by R. H. Beck at the Astrolabe Bay and on the Huon Peninsula, I became convinced that there were two species, and Dr. A. Rand came independently to the same conclusion while he was undertaking the preliminary identification of the birds of the Archbold-Rand 1933 New Guinea Expedition. The splendid material gathered by this expedition permits no longer even the slightest doubt as to the specific distinctness of *vanikorensis* and *hirundinacea* (see Mayr and Rand, 1937, Bull. Amer. Mus. Nat. Hist., LXXIII, p. 77).

Of all the subspecies of *vanikorensis* the one that has the same range as *hirundinacea* is also most similar to it in coloration as well as measurements and proportions. To facilitate the identification of these gray New Guinea swiftlets, I want to summarize again the differences between the two species *hirundinacea* and *vanikorensis* (see also Mayr and Rand, *loc. cit.*). *Collocalia hirundinacea* differs from *C. vanikorensis* by having the tarsus feathered, by having a smaller and more curved bill, by having much more white on the back (see footnote p. 4), by being smaller, by having the upper parts darker and more bluish, by having the crown decidedly darker than the back, by having lighter, more silvery gray under parts, by not having the throat contrasting with a much darker abdomen, by having under wing-coverts and feathers of the superciliary pure black not with pale edges, and by having a different ecology. *C. hirundinacea* is a bird of the hills and mountains right up to the highest peaks, but is rare in the lowlands; *C. vanikorensis* is common on the coast and in the lowlands, rare in the hills and has never been collected

above 1400 m. There is some variation in several of these characters, but the combination of these characters helps to identify almost every specimen. There are only two birds from the lowlands of southeast New Guinea in the collections of the American Museum which do not quite fit the above definition (see pp. 14-15).

***Collocalia hirundinacea hirundinacea* Stresemann**

Collocalia fuciphaga hirundinacea STRESEMANN, 1914, Verh. Orn. Ges. Bayern, XII, p. 7.—"Utakwa" [= Setekwa] River, Dutch New Guinea.

Collocalia fuciphaga pseudovestita STRESEMANN, 1923, Arch. Naturgesch., LXXXIX, fasc. 8, p. 27.—Friedrich Wilhelms'hafen [= Madang], Astrolabe Bay.

Collocalia fuciphaga mayri HARTERT, 1930, Novit. Zool., XXXVI, p. 93.—Siwi, Arfak Mts.

A comparative description has been given p. 12, for further details on the various populations, see below, pp. 13-14.

Wing 114-117 (115.6), outermost tail-feather 48-53 (49.2), central tail-feather 41-45 (42.5), furcation 6-9 (7.4), tail-index 42.6.

RANGE.—All New Guinea, Dampier, and Goodenough Islands.

I doubt the validity of *pseudovestita*; when Stresemann described this form, part of his material belonged to *vanikorensis*, part of it consisted of old and foxed specimens. When Hartert described *mayri* on the basis of the heavy feathering of the tarsus, he compared the unique type with a series of "*hirundinacea*" which partly consisted of specimens of *vanikorensis* with bare tarsi. The only possible differences of *mayri* compared to *hirundinacea* are the paleness of the under parts and the practical absence of shaft-streaks on the abdomen. It is true, however, that lowland specimens of *hirundinacea* usually have less feathering on the tarsus than birds collected in the mountains.

Wear and foxing (the effects of these two factors have been described on p. 5) are the main reason why collections from the different parts of New Guinea in the A. M. N. H. Collection do not agree in all details of coloration. It might be valuable to describe these differences in detail, because the possibility exists that some of these differences are due to geographical variation.

SETEKWA RIVER, DUTCH NEW GUINEA (1910).¹—The typical series of three specimens (including the type) is now 27 years old and shows considerable evidence of foxing. The type is worn and molting (July 28), another August specimen has molted much of its body plumage but wings and tail are worn and old, a third specimen (Sept. 13), is fresh throughout. Foxing has given the under parts a somewhat brownish

¹ In parentheses, the year in which the specimens were collected.

appearance, as compared to the silvery gray of freshly collected birds. Streaking on lower belly is present, but inconspicuous; upper parts RATHER dark (for example as compared to a series from the Hydrographer Mts.) and even in fresh specimens rather bluish green. Tarsus feathering always present, but rather slight.

LOWER MENOO (300 m.) (1931).—1 ♂ ad. Quite dark above and below; streaking on lower belly very pronounced; feathering of tarsus slight; size of white loreal spot reduced.

SIWI-ARFAK (800 m.). (1928).—1 ♂ ad. (type of *mayri*). Very light underneath, but rather worn; near the end of its molt; streaks on belly almost absent; upper parts dark, white basal feathers reduced.

DAMPIER IS. (1914).—1 ♀ ad. Rather brownish underneath; shaft-streaks on belly fairly conspicuous; tarsal feathering slight; upper parts rather dark; white feathering on back very pronounced; white loreal spot medium.

ZAKAHEME (HUON PENINSULA) (1929).—Six specimens. Rather light and silvery underneath; shaft-streaks on lower belly inconspicuous; feathering on tarsus apparently originally quite strong, though largely lost in most specimens due to poor preservation; white loreal spot rather large; upper parts lighter and more greenish than in typical series; white feathering on back rather strongly developed.

HYDROGRAPHER MTS. (1918).—Three specimens. Rather light and silvery underneath, but shaft-streaks well developed; tarsi strongly feathered; white loreal spots large; upper parts similar to Zakaheme series, though not quite as greenish; white feathering on back medium.

GOODENOUGH IS. (1896).—One specimen. 40 years old and rather foxed. Originally apparently rather dark above and rather bluish green; tarsi fairly well feathered; underneath now rather brownish, although without shaft-streaks; supraloral spots large; white feathering on back medium.

MURRAY PASS 2840 m. (1933).—Three ♂ ad. Rather greenish above and not quite as dark as typical birds; underneath grayish, a little darker than Zakaheme birds, shaft-streaks on belly present, but not very conspicuous; tarsi strongly feathered, supraloral spots medium; white feathering on back very pronounced.

Specimens from Ononge, Mt. Albert Edward and Mt. Tafa are similar.

Here follows the description of two unusual specimens:

KUBUNA (100 m.) (1933).—1 ♂. Above greenish and a shade darker than the mountain birds; underneath distinctly darker than the

Zakaheme series, particularly on belly, with shaft-streaks very inconspicuous; tarsi halfway feathered; under tail-coverts rather dark; loral spot small; **WHITE FEATHERING ON BACK ABSENT**; crown not darker than back, but rump (apparently belonging to earlier plumage) definitely lighter; tail very slightly furcated.

Wing 113, tail 41/45 (4), index 39.8; very short tail.

BAROKA (sea-level) (1933).—1 ♂. Above quite dark, much darker than mountain birds and rather bluish green; crown darker than back; underneath fairly light, with just a shade of brownish, under tail-coverts fairly dark; shaft-streaks present, but not strongly developed; **TARSI PRACTICALLY BARE**; loral spot large; white feathering on back **VERY** pronounced.

Wing 110, tail 39.5/47, (7.5), index 42.7.

More material from the lowlands of southeast New Guinea is needed to determine the taxonomic status of these two specimens.

***Collocalia hirundinacea excelsa* Ogilvie-Grant**

Collocalia hirundinacea excelsa Ogilvie-Grant, 1914, Bull. Brit. Orn. Club, XXXV, p. 34.—Utakwa River, 8000 feet. [Not seen.]

According to the original description in coloration like *hirundinacea*, but very much larger.

Male, wing 127, tail 56, tail-index 44.1; female, wing 131, tail 63, tail-index 48.1. (This would indicate an exceptionally long tail, but I doubt the correctness of Ogilvie-Grant's measurement.)

RANGE.—Only known from the type-locality, but probably throughout the higher altitudes of the Snow Mts.

It is interesting that the birds collected by the Archbold 1933 Expedition on Mt. Albert Edward (3700 m.) and Murray Pass (2800 m.) are not much larger than lowland *hirundinacea*. Most of these specimens are unfortunately molting their longest wing-feathers, but a series of tail-measurements (outermost feathers) is as follows: 49.5, 50, 51, 51, 51, 52, 53, 53, 56 (51.8). This averages larger than a series of lowland birds (48–53 (49.2)), but the difference is not sufficient for subspecific separation.

***Collocalia hirundinacea baru* Stresemann and Paludan**

C. vanikorensis baru STRESEMANN AND PALUDAN, 1932, Novit. Zool., XXXVIII, p. 167.—Kampong Baru, Japen Island.

Similar to *hirundinacea*, but averaging smaller; under parts slightly and upper parts very much darker and more bluish; shaft-streaks on abdomen pronounced; supraloral spots large; much white on back; tarsi fairly well feathered, at least in upper part.

Wing (6) 109–114.5 (111.2), central tail-feather 40–41, outer tail-feather 46–48 (47.8), furcation 6–8 (7.4), tail-index 43.0.

RANGE.—Only known from the type-locality.

Collocalia spodiopygia

Under this name I combine a number of forms with whitish rumps which occur east of the Wallace line, except on New Guinea, and the Papuan Islands. Stresemann (1932, Novit. Zool., XXXVIII, pp. 164–170) distributes these forms in two species; the eastern ones (Polynesia and Melanesia) he includes in *spodiopygia*, the western ones (North Australia, Moluccas, Celebes) he includes in *vanikorensis*. He does not mention any morphological characters by which these two groups can be distinguished, in fact he says of *ceramensis* (which he includes with *vanikorensis*) “apparently not distinguishable” from *leucopygia* (which belongs to *spodiopygia*).

I propose to include the western forms and the eastern forms in one species, because I am unable to find any morphological characters by which they could be separated. They all agree in having a well-pronounced whitish rump-band, not merely a paling of the lower back as most of the *germani* forms. The black rumped *hirundinacea* is obviously a geographical representative of *spodiopygia*. Both species agree in most of their essential morphological features and their ranges do not overlap anywhere. Stresemann (*loc. cit.*, p. 165, 169) described a series of *C. infuscata* from the northern Moluccas in which some specimens have the white rump, others lack it. I have recently been able to examine this series of *infuscata*, owing to the kindness of Dr. Stresemann, and it has fully confirmed my previous conclusions. *C. sp. infuscata* is a darkened form of the *spodiopygia* group, not very different from *sororum*. The rump-band is dark gray, not pale gray as in most *spodiopygia* forms, and is practically absent in one specimen. This latter bird is very similar to *Collocalia hirundinacea baru* Stres. and Pal. The fact that the rump-band is variable shows clearly that the relationship between *spodiopygia* and *hirundinacea* is still closer than was hitherto apparent.

A detailed revision of the species *spodiopygia* is in preparation. I shall content myself at the present time to list all the described forms which I propose to include in this species: *spodiopygia* (Samoa), *townsendi* (Tonga), *assimilis* (Fiji), *leucopygia* (New Caledonia), *reichenowi* (Solomon Islands), *eichhorni* (Bismarck Archipelago), *terraereginae* (North Queensland), *ceramensis* (southern Moluccas), *infuscata* (northern Moluccas), and *sororum* (Celebes).

Collocalia leucophaea, *vanikorensis* + *inquieta*, and *spodiopygia* + *hirundinacea* are the species of gray *Collocalia* that are endemic east of the Wallace line. Some forms of western species (*micans*, *bartschi*, and *pelewensis*) have entered the Australian Region near its western border. I have seen only very little material from west of the Wallace line and have examined only a few types. Although this makes it impossible for me to undertake a revision of all the forms, I would like to record a few of the preliminary results of my studies.

Collocalia "mearnsi"

This comprises forms usually grouped with *vestita* (Sumatra). Not having seen any material from Sumatra, I choose temporarily the safer name "*mearnsi*." Distinguished by the following characters: rump dark and glossy as back; tarsus feathered; size small; upper parts dark, more blackish, with a pronounced bluish-green gloss; crown dark bluish green, quite distinct from the paler and more greenish back; crown covered by many, but small feathers; under wing-coverts uniformly dark; feathers of throat very soft; bill strongly curved; tail medium long, but little furcated; much white on back.

RANGE.—Philippines, Borneo, and Maratua.

This species is closely related to *hirundinacea* and *spodiopygia*.

Collocalia germani

Under this name I group several forms usually called *francica*. I have not seen any specimens of *francica*, but it seems altogether unlikely in this genus of strongly localized species, that a species from Mauritius should be conspecific with one occurring in Malaysia.

It is principally this species which makes the edible nests. It is distantly related to *Collocalia vanikorensis*. Its chief characters are: rump frequently paler than back; upper parts rather pale with a brownish-green gloss; crown greenish, only slightly darker than back; crown covered by few, but larger feathers; much white on back; under wing-coverts usually with broad pale edges; size large, tail short, but fairly well furcated; tarsus bare or slightly feathered, particularly in highland populations; bill fairly large and only weakly curved; feathers of throat often with shaft-streaks. As always with these species descriptions, not all of the above given characteristics apply necessarily to every individual, but the combination of these characters will serve to separate these birds from similar species. I have seen much too little material to say anything about the geographical variation within this spe-

cies, but it seems that the following races belong to *germani*: *micans* (Timor, etc.), *dammermani* (Flores), *javensis* (Java, if different from *dammermani* and *perplexa*), *perplexa* (Maratua), *bartelsi* (??) (Java), *amelis* (Philippines), *pelewensis* (Palau), *bartschi* (Marianne Is.), *amechana* (Anamba Is., not seen!), and *germani* (coast of Borneo, Malay Peninsula north to Indo-China).

Collocalia fuciphaga

This name has been restricted by Stresemann to the large highland species of Java (1914, Verh. Ornith. Ges. Bayern, XII, p. 3).

It is characterized by large size (118–122), bare tarsus and a big bill. The rump is as dark as the back, the upper parts are rather dark with a greenish gloss, the crown is only slightly darker than the back. THERE IS NO WHITE ON THE BACK (see footnote, p. 4). The tail is long (tail-index 45.7) and fairly well furcated 6–9 (8.1).

This species has never been found outside of Java, but there is on the Natuna Islands and on north Borneo a population, which is amazingly similar to it, except that it has a very short tail (index 38.2) which is hardly at all furcated (3–4, 3.3). This species, also characterized by the absence of white on the back, has been named *natunae* by Stresemann (1930, Ornith. Monatsber., XXXVIII, p. 181). The recently learned fact, that short-tailed and long-tailed populations may occur in one species (*leucophaea*, *vanikorensis*), makes it possible to think of a relationship of these two species. It is quite certain, however, that *natunae* has nothing to do with *mearnsi*. The possible relationship of *natunae* with *lowi* and several mainland forms requires further investigation.

I have seen too little material to say anything about *lowi*, *inexpectata*, *innominata*, *brevirostris*, *unicolor*, *aerophila*, *vestita*, *elaphra*, and *francica*. Several of these are probably good species.

Excluding the Asiatic forms, also the species *esculenta*, *trogodytes*, *lowi*, *whiteheadi*, and *gigas*, as well as the forms *vestita*, *bartelsi*, and *vulcanorum*, which are unknown to me, I find the following distribution of the above discussed forms. The nine specific groups, admitted by me, may have to be reduced after further investigation. *C. spodiopygia*, *hirundinacea*, and *mearnsi* are related and possibly conspecific, the same is true for *vanikorensis* and *inquieta*, and for *fuciphaga* and *natunae*.

EASTERN POLYNESIA.—1) *leucophaea* (+ *ocista*)

CENTRAL POLYNESIA.—2) *spodiopygia* (+ *townsendi* + *assimilis*)

SOUTHERN MELANESIA.—2) *spodiopygia* (*leucopygia*); 3) *vanikorensis*

NORTHERN MELANESIA.—2) *spodiopygia* (*reichenowi* + *cichhorni*);

3) *vanikorensis* (+ *lihirensis* + *coultasi*)

NEW GUINEA REGION.—3) *vanikorensis* (*granti* + *tagulae* + *steini* + *waigeuensis*); 4) *hirundinacea* (+ *excelsa* + *baru*)

CAPE YORK.—2) *spodiopygia* (*terraereginae*); 3) *vanikorensis* (*yorki*)

MOLUCCAS.—2) *spodiopygia* (*ceramensis* + *infuscata*); 3) *vanikorensis* (*moluccarum*)

CELEBES REGION.—2) *spodiopygia* (*sororum*); 3) *vanikorensis* (*aenigma* + *heinrichi*)

CAROLINES.—5) *inquieta* (+ *rukensis* + *ponapensis*)

WESTERN MICRONESIA.—6) *germani* (*bartschi* + *pelewensis*)

LESSER SUNDA ISLANDS.—6) *germani* (*micans* + *dammermani*)

JAVA.—6) *germani* (*javensis*); 8) *fuciphaga*

BORNEO.—6) *germani* (+ *perplexa*); 7) *mearnsi* (+ *maratua*); 9) *natunae*

PHILIPPINES.—6) *germani* (+ *amelis*); 7) *mearnsi*

